WE CLAIM:

1. A multipath-combining subsystem for use with a spread-spectrum receiver for receiving a spread-spectrum signal arriving at different times from a plurality of paths, with the spread-spectrum signal having a plurality of packets with each packet having a header followed by a data portion, with the header including a header-chip-sequence signal, and with the data portion including a data-symbol-sequence signal, with each data symbol of the data-symbol-sequence signal spread-spectrum processed by a data-chip-sequence signal, said multipath-combining subsystem comprising:

matched-filter means, coupled to said spread-spectrum receiver, having a first impulse response matched to the header-chip-sequence signal of the header embedded in the spread-spectrum signal, for detecting, within a packet and for each path of the spread-spectrum signal, each match of the header-chip-sequence signal with the first impulse response, with a time difference between receiving each path of the spread-spectrum signal greater than a time of each chip of the header-chip-sequence signal and greater than a time of each chip of the data-chip-sequence signal, and for outputting, responsive to a detected match having a correspondence between the header-chip-sequence signal and the first impulse response above a header threshold, a header detection signal having a header amplitude and a respective chip location;

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header-memory means, coupled to said matched-filter means, for storing the header amplitude of each header-detection signal and the respective chip location of each header-detection signal;

said matched-filter means having a second impulse response matched to the data-chip-sequence signal of the data portion embedded in the spread-spectrum signal, for detecting, at the respective chip location of each header-detection signal for each path, each match of the data-chip-sequence signal with the second impulse response, and for outputting, responsive to each detected match, a data-detection signal having a data amplitude; and

combining means, coupled to said header-memory means and to said matched-filter means, for multiplying the header amplitude of each header-detection signal by the data amplitude of each data-detection signal at each corresponding chip location, respectively, thereby generating a plurality of weighted elements for each data symbol within the data portion, and for combining the plurality of weighted elements of a respective data symbol as a sum signal of the respective data symbol.

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2. The multipath-combining subsystem as set forth in claim 1 wherein said combining means includes:

product means for multiplying, for each data symbol, the header amplitude of each header-detection signal by the data amplitude of each data-detection signal, at each corresponding chip location, respectively, thereby generating a plurality of weighted elements for each data symbol of the data-symbol-sequence signal;

a combiner memory for storing the plurality of weighted elements; and

adding means for adding each weighted element of the plurality of weighted elements for each data symbol to generate the sum signal of the respective data symbol.

3. The multipath-combining subsystem as set forth in claim 1 further including:

a header-pattern generator, responsive to the header-detection signal, for generating a header pattern; and

said matched-filter means, responsive to the header pattern, for detecting each match of the data-chip-sequence signal with the second impulse response.

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4. The multipath-combining subsystem as set forth in claim 3 wherein said combining means includes:

product means for multiplying the header amplitude of each header-detection signal by the data amplitude of each data-detection signal, at each corresponding chip location, respectively, thereby generating a plurality of weighted elements for each data symbol of the data-symbol-sequence signal;

a combiner memory for storing the plurality of weighted elements; and

adding means for adding each weighted element of the plurality of weighted elements for each data symbol to generate the sum signal of the respective data symbol.

5. The multipath-combining subsystem as set forth in claim 1 further including a demodulator, coupled to said combining means, for detecting data from the sum signal.

6. The multipath-combining subsystem as set forth in claim 1 further including:

a header-timing circuit for detecting, from a plurality of header-detection signals, a strongest header-detection signal and, responsive to the strongest header-detection signal, for outputting a packet-start signal; and

said matched-filter means, responsive to the packet-start signal, for changing the first impulse response to the second impulse response.

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7. The multipath-combining subsystem as set forth in claim 1 wherein said matched-filter means includes:

a header-matched filter, coupled to said spread-spectrum receiver, having the first impulse response matched to the header-chip-sequence signal of the header embedded in the spread-spectrum signal, for detecting, within each packet and for each path of the spread-spectrum signal, each match of the header-chip-sequence signal with the first impulse response, and for outputting, responsive to a detected match having a level of correspondence above the header threshold, the header-detection signal having a header amplitude and a respective chip location; and

a data-matched filter, having the second impulse response matched to the data-chip-sequence signal of the data portion embedded in the spread-spectrum signal, for detecting, at the respective chip location of each header-detection signal for each path, each match of the data-chip-sequence signal with the second impulse response, and for outputting, responsive to each detected match, the data amplitude of the data-detection signal.

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8. The multipath-combining subsystem as set forth in claim 1 wherein said matched-filter means includes:

a programmable-matched filter, coupled to said spread-spectrum receiver, having the first impulse response initially matched to the header-chip-sequence signal of the header embedded in the spread-spectrum signal, for detecting, within each packet and for each path of the spread-spectrum signal, each match of the header-chip-sequence signal with the first impulse response, and for outputting, responsive to a detected match having a level of correspondence above the header threshold, a header detection signal having a header amplitude and a respective chip location; and

said programmable-matched filter, having the second impulse response matched to the data-chip-sequence signal of the data portion embedded in the spread-spectrum signal, for detecting, at the respective chip location of each header-detection signal for each path, each match of the data-chip-sequence signal with the second impulse response, and for outputting, responsive to each detected match, the data amplitude of the data-detection signal.

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9. The multipath-combining subsystem as set forth in claim 7 or 8 wherein said combining means includes:

product means for multiplying the header amplitude of each header-detection signal by the data amplitude of each data-detection signal, at each corresponding chip location, respectively, thereby generating a plurality of weighted elements for each data symbol of the data-symbol-sequence signal within each path;

a combiner memory for storing the plurality of weighted elements; and

adding means for adding each weighted element of the plurality of weighted elements for each data symbol as the sum signal of the respective data symbol.

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10. A multipath-combining subsystem for use with a spread-spectrum receiver for receiving a spread-spectrum signal arriving at different times from a plurality of paths, with the spread-spectrum signal having a plurality of packets with each packet having a header followed by a data portion, with the header including a header-chip-sequence signal, and with the data portion including a data-symbol-sequence signal, with each data symbol of the data-symbol-sequence signal spread-spectrum processed by a data-chip-sequence signal, said multipath-combining subsystem comprising:

a header-matched filter, coupled to said spread-spectrum receiver, having a first impulse response matched to the header-chip-sequence signal of the header embedded in the spread-spectrum signal, for detecting, within a packet and for each path of the spread-spectrum signal, each match of the header-chip-sequence signal with the first impulse response, with a time difference between receiving each path of the spread-spectrum signal greater than a time of each chip of the header-chip-sequence signal and greater than a time of each chip of the data-chip-sequence signal, and for outputting, responsive to a detected match having a correspondence between the header-chip-sequence signal and the first impulse response above a header threshold, a header detection signal having a header amplitude and a respective chip location;

a header memory, coupled to said header-matched filter, for storing the amplitude and the respective chip location of each header-detection signal;

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a symbol-matched filter, having a second impulse response matched to the data-chip-sequence signal of the data portion embedded in the spread-spectrum signal, for detecting, at the respective chip location of each header-detection signal for each path, each match of the data-chip-sequence signal with the second impulse response, and for outputting, responsive to each detected match, a data-detection signal having a data amplitude;

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a header-timing circuit, coupled to an output of said header-matched filter, for detecting, from a plurality of header-detection signals, a strongest header-detection signal and, responsive to the strongest header-detection signal, for outputting a packet-start signal;

product means, coupled to an output of said header-matched filter and to an output of said header-timing circuit, for multiplying the header amplitude of each header-detection signal by the data amplitude of each data-detection signal at each corresponding chip location, respectively, thereby generating a plurality of weighted elements for each data symbol of the data-symbol-sequence signal within the data portion of the packet;

adding means, coupled to an output of said product means, for adding the plurality of weighted elements for a respective data symbol to generate a sum signal of the respective data symbol;

a combiner memory, coupled to an output of said adding means, for storing the sum signal; and

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a data demodulator, coupled to said combiner memory, for detecting data from the sum signal.

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11. A multipath-combining subsystem for use with a spread-spectrum receiver for receiving a spread-spectrum signal arriving at different times from a plurality of paths, with the spread-spectrum signal having a plurality of packets with each packet having a header followed by a data portion, with the header including a header-chip-sequence signal, and with the data portion including a data-symbol-sequence signal, with each data symbol of the data-symbol-sequence signal spread-spectrum processed by a data-chip-sequence signal, said multipath-combining subsystem comprising:

a programmable-matched filter, coupled to said spread-spectrum receiver, having a first impulse response matched to the header-chip-sequence signal of the header embedded in the spread-spectrum signal, for detecting, within a packet and for each path of the spread-spectrum signal, each match of the header-chip-sequence signal with the first impulse response, with a time difference between receiving each path of the spread-spectrum signal greater than a time of each chip of the header-chip-sequence signal and greater than a time of each chip of the data-chip-sequence signal, and for outputting, responsive to each detected match above a header threshold, a header detection signal having a header amplitude and a respective chip location;

a header memory, coupled to said programmable-matched filter, for storing the header amplitude and the respective chip location of each header-detection signal;

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a header-timing circuit, coupled to an output of said programmable-matched filter, for detecting, from a plurality of header-detection signals, a strongest header-detection signal and, responsive to the strongest header-detection signal, for outputting a packet-start signal;

said programmable-matched filter, responsive to the packet-start signal, for changing the first impulse response to a second impulse response, the second impulse response matched to the data-chip-sequence signal of the data portion embedded in the spread-spectrum signal, for detecting, at the respective chip location of each header-detection signal for each path, each match of the data-chip-sequence signal with the second impulse response, and for outputting, responsive to each detected match, a data-detection signal having a data amplitude;

product means, coupled to an output of said programmable-matched filter and to an output of said header-timing circuit, for multiplying the header amplitude of each header-detection signal by the data amplitude of each data-detection signal at each corresponding chip location, respectively, thereby generating a plurality of weighted elements for each data symbol of the data-symbol-sequence signal within the data portion of the packet;

adding means, coupled to an output of said product means, for adding the plurality of weighted elements for a respective data symbol to generate a sum signal of the respective data symbol;

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a combiner memory, coupled to an output of said adding means, for storing the sum signal; and

a data demodulator, coupled to said combiner memory, for detecting data from the sum signal.

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12. A multipath-combining method for use with a spread-spectrum receiver for receiving a spread-spectrum signal arriving at different times from a plurality of paths, with the spread-spectrum signal having a plurality of packets with each packet having a header followed by a data portion, with the header including a header-chip-sequence signal, and with the data portion including a data-symbol-sequence signal, with each data symbol of the data-symbol-sequence signal spread-spectrum processed by a data-chip-sequence signal, said multipath-combining method comprising the steps of:

a. detecting, with a first impulse response matched to the header-chip-sequence signal of the header embedded in the spread-spectrum signal, within a packet and for each path, each match of the header-chip-sequence signal with the first impulse response, with a time difference between receiving each path of the spread-spectrum signal greater than a time of each chip of the header-chip-sequence signal;

b. outputting, in response to each detected match above a header threshold, a header-detection signal having a header amplitude and a respective chip location;

c. storing the header amplitude and the respective chip location of each header-detection signal;

d. detecting, with a second impulse response matched to the data-chip-sequence signal embedded in the data portion of the spread-spectrum signal, at the respective chip location of each header-detection signal for each path, each match of the data-chip-sequence signal with the second impulse response;

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e. outputting, responsive to each detected match, a data-detection signal having a data amplitude;

f. multiplying the header amplitude of each header-detection signal with the data amplitude of each data-detection-signal at each corresponding chip location, respectively, thereby generating a plurality of weighted elements for each data symbol of the data-symbol-sequence signal; and

g. adding the plurality of weighted elements for a respective data symbol as a sum signal of the respective data symbol.

13. The multipath-combining method as set forth in claim 12, wherein the step of (c) storing includes the step of buffering a plurality of header-detection signals corresponding to the plurality of paths.

14. The multipath-combining method as set forth in claim 12 further including the step of generating a header pattern responsive to each occurrence of the header-detection signal within a frame of the header-chip-sequence signal.

15. The multipath-combining method as set forth in claim 12 further including the step of detecting data from the sum signal.

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16. The multipath-combining method as set forth in claim 12 further including the steps of:

h. detecting, from a plurality of header-detection signals within the packet, a strongest header-detection signal; and

i. outputting, responsive to the strongest header-detection signal, a packet-start signal.

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